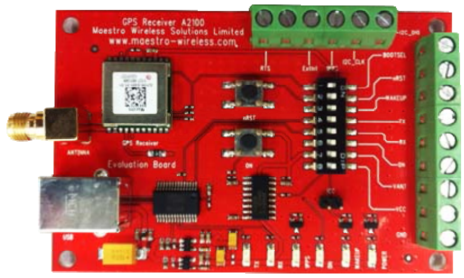
GPS SiRFstarIV Evaluation Kit EVA2100-A/B

A Description of the Evaluation Board for Maestro's SiRFstarIV GPS Receiver Module A2100-A/B

User's Manual

Version 1.0



Revision History

Rev.	Date	Description
0.1	03-15-10	Initial Draft
0.2	04-13-10	Update
0.3	04-14-10	R&D review
0.4	05-10-10	Note on shut-down sequence
0.5	02-09-11	New style; moved to Maestro
0.6	06-21-11	Add some pictures
1.0	01-04-12	Add describe of the EVA2100-B
	mm-dd-yy	

	Name	Date	Signature
Written by	Happy wen	01-04-12	H W
Checked by	Sam Law, Wallace Lee	01-04-12	S L,W L
Approval by	Frank Tang, Calvin Yau	01-04-12	F T,C Y

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Table of Contents

1 Introduction

1.1 Purpose

The GPS Evaluation Kit EVA2100-A/B allows an easy evaluation of Maestro's SiRFstarIV GPS receiver module A2100-A and A2100-B by offering quick access to the serial ports and the most important I/O lines of the module.

The EVA2100-A/B serves three major purposes:

- As a demonstration package of the module's capabilities
  Powering the A2100-A/B GPS receiver module via the USB connector and connecting the GPS antenna with sufficient view to the sky will result in an NMEA output with position information.

- As an example how to integrate the module into a system
  The schematic in chapter "10 Board Schematics" is a basic example of how to integrate the GPS module into an application or system.

- To support an easy temporary design in
  The signals provided on the Evaluation Kit allow direct integration into a surrounding system making it an ideal development tool.

The EVA2100-A/B can especially demonstrate that an active GPS antenna connected to the Antenna Input will result in outstanding GPS performance.

1.2 Contents

The EVA2100-A/B includes the following components:

- Evaluation board (labeled EVA2100-A/B) with one A2100-A/B GPS receiver
- Active GPS antenna
- USB cable to connect to your PC
- CD with complete documentation and Maestro's GPS Cockpit software

Please check your package for completeness and connect the components properly.

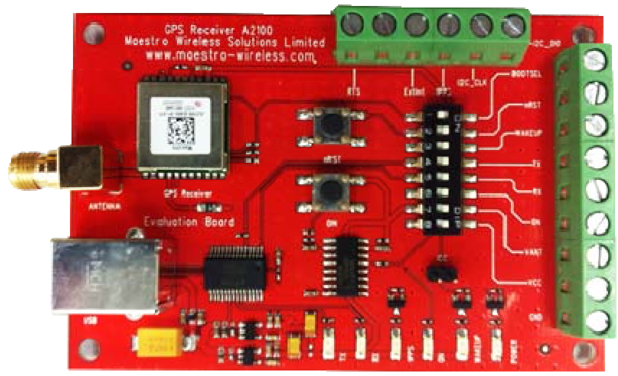


Figure 1: Evaluation board EVA2100-A/B



Figure 2: Active GPS antenna with SMA connectors



Figure 3: USB cable with A/B type connectors



Figure 4: CD

1.3 General Information

1.3.1 Ordering

The order number is built as follows:

- EVA2100-A
- EVA2100-B

The board will always be shipped with latest firmware. Information on sales channels can be found on Maestro's web page.

1.3.2 Firmware, Tools, and Documents

New firmware will be made available on Maestro's web page as soon as released together with according release notes. Tools for programming the board and for evaluating GPS features can be downloaded as well as latest documentation.

1.4 Handling Precautions

The EVA2100-A/B contains components that are sensitive to electrostatic discharge (ESD). Please handle with appropriate care.

2 Quick Start

(1) Connect the EVA2100-A/B with your PC using the included USB cable.

(2) When the PC asks for drivers select the folder "Tools\Drivers" on the included CD ROM.

Note: Two drivers need to be installed, the EVA2100-A/B FTDI driver and the USB serial driver.

Note: During the driver installation process your Windows system will probably notify you, that the driver did not pass Windows logo testing with a warning:

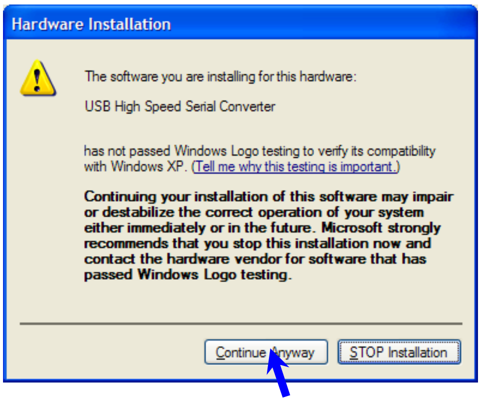


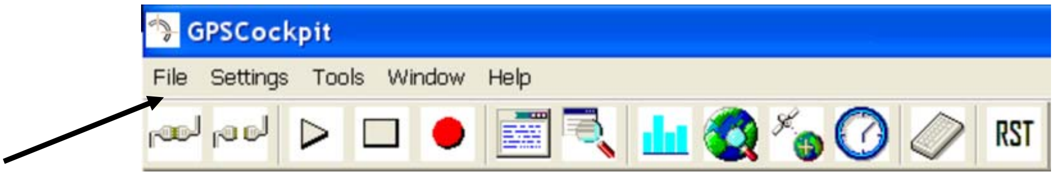
Figure 5: Windows driver installation warning

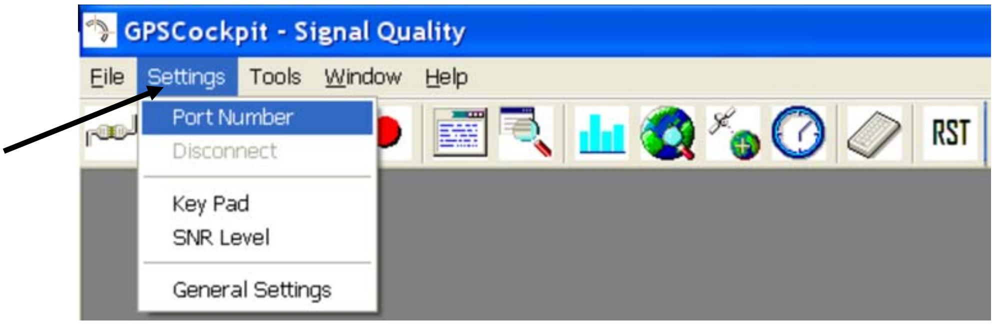
(3) Connect the included active GPS antenna to the antenna connector of the EVA2100-A/B; make sure that the antenna has a good view to the sky!

(4) Make sure all DIP switches are in ON position except for the BOOTSEL DIP switch which must be in OFF position.

(5) To start the GPS Cockpit software which visualizes the NMEA output data coming from the GPS receiver, copy all files from the included CD ROM "Tools/GPS Cockpit" to a folder of you choice on your PC. Then double click the GPSC.exe file. The GPS cockpit software starts without additional software installation. A detailed description of the GPS Cockpit software is included on the CD ROM.

(6) Activate the correct port within GPS Cockpit. You can do this by selecting the “COM port connection” icon (left-most icon) or by choosing “Port Number” in the “Settings” menu.





In both cases the following window will appear:

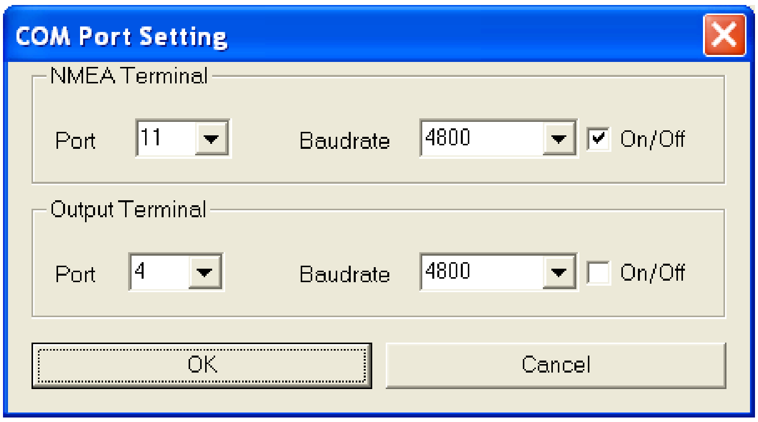
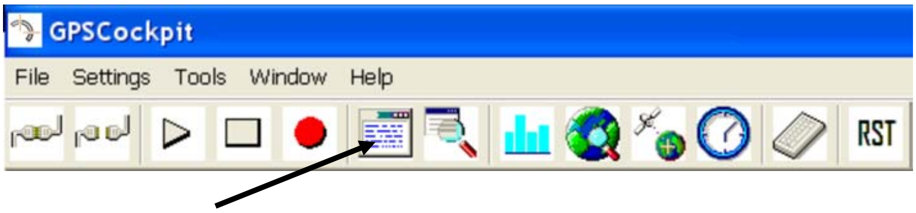


Figure 6: GPS Cockpit COM Port Setting window

Choose the COM port to which the GPS receiver is connected (verify in your system settings - device manager, which communication port is used for this USB serial connection), in our example COM11 at 4800 baud (default setting for the EVA2100-A/B), make sure that the On/Off box is checked, and click on “OK”:

(7) Open the NMEA Terminal window to see NMEA sentences by using the “NMEA Terminal” window button. You will see no messages!



(8) In order to start the module, you need to push the “ON” button of the evaluation board. Then only you will see messages like this:

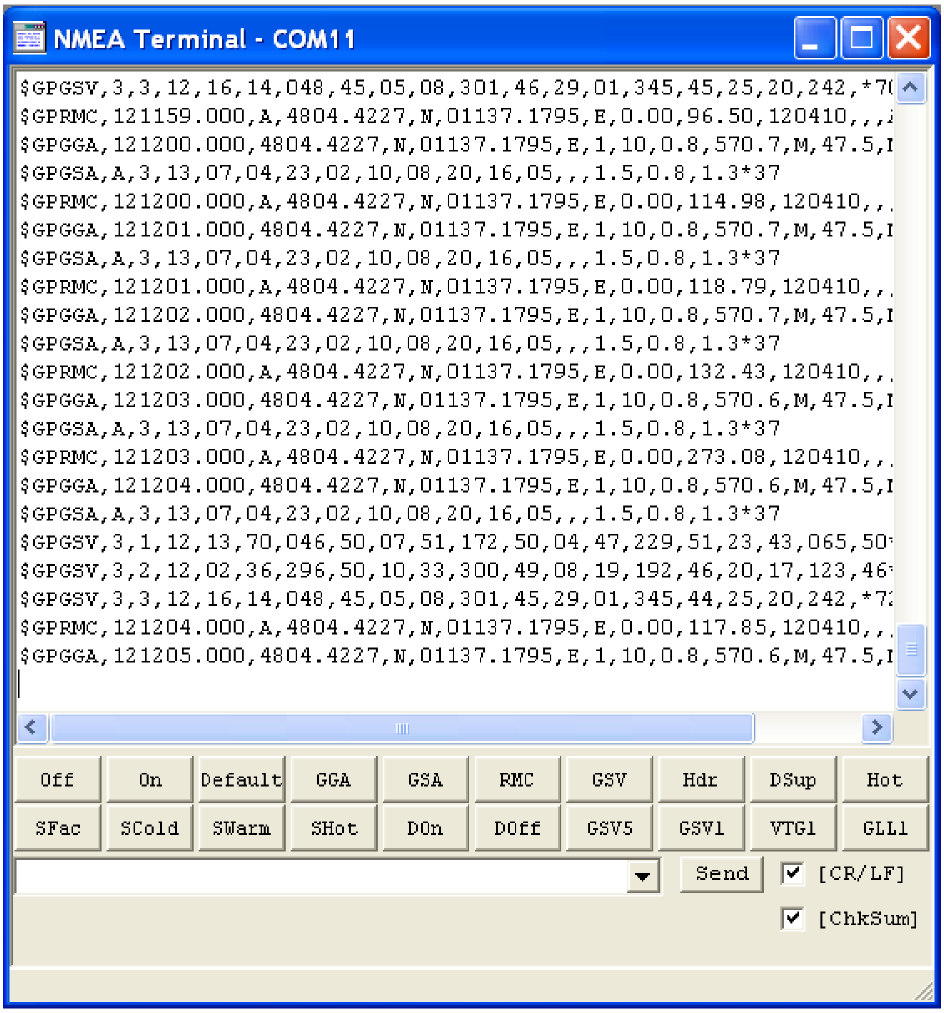


Figure 7: GPS Cockpit NMEA terminal with NMEA data

Now you can start using all the other windows and features of GPS Cockpit. Please refer also to the GPS Cockpit manual and the online help within GPS Cockpit.

3 Potential Problems with Windows

3.1 Ballpoint Mouse

After successful driver installation and after pushing the "ON" button of the EVA2100-A /B Windows might interpret the data coming over the serial interface as a serial ballpoint mouse! Your mouse pointer can start jumping around. To stop this, disable the according device using your device manager. Leave the EVA2100-A/B kit connected and push the nRST button once. The module will stop to transmit data. To fix the problem you will find the device under "Mice and other pointing devices". Use a right click to open the sub-menu and disable the device.

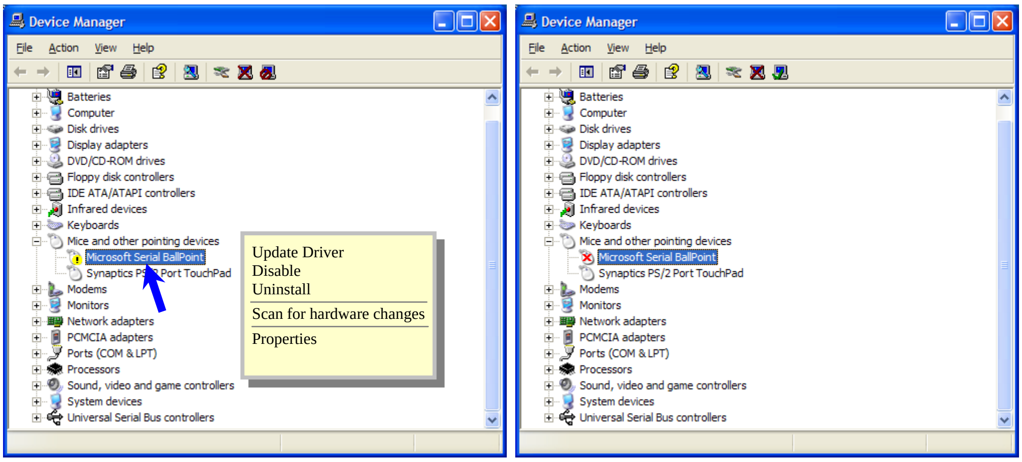


Figure 8: Disabling of Microsoft Serial BallPoint

Afterwards you will be able to continue in a normal way. Don't forget to push the "ON" button again to receive NMEA data.

3.2 Missing Graphics

In case you can see only textual information within GPS Cockpit and no graphics, you need to change the "Color quality" within the "Display Properties" under tab "Set-tings".

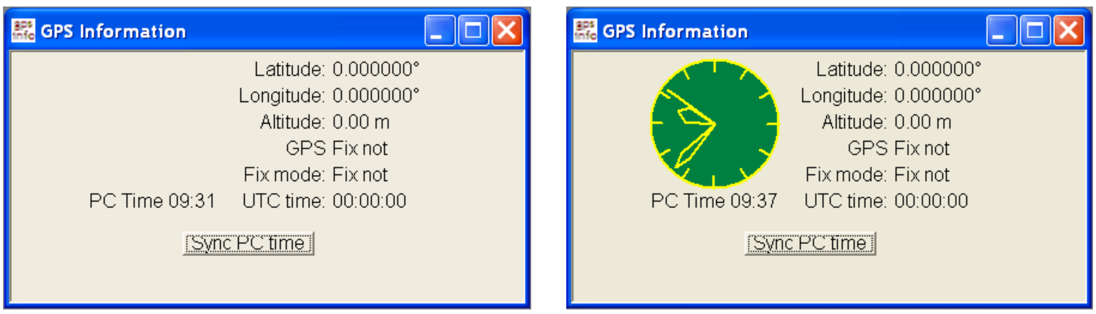


Figure 9: GPS Information window without and with clock

So please make sure that the “Color quality” within the “Display Properties” is set to “Highest (32 bit)”. “Display Properties” can be invoked by a right click on your desktop and selecting “Properties”.

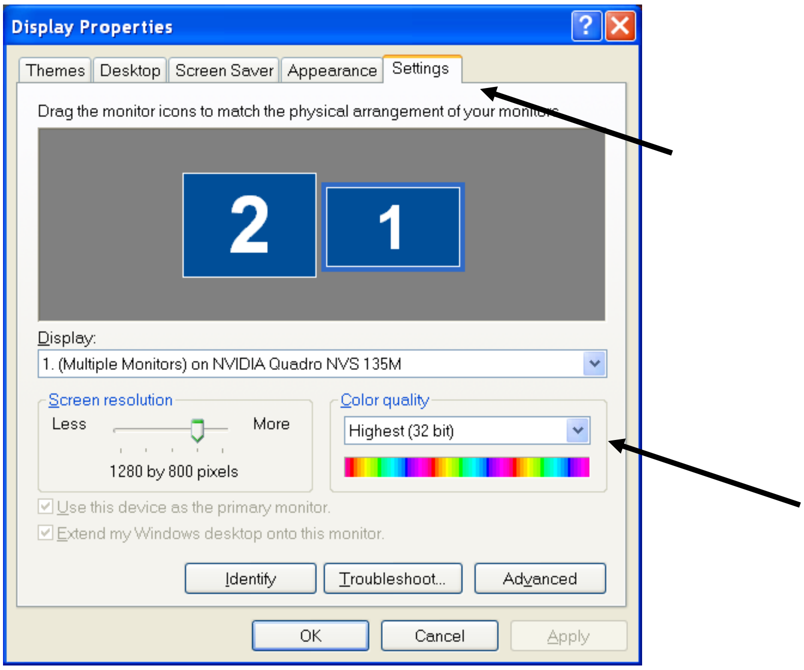


Figure 10: “Color quality” within “Display Properties”

4 Board Overview

The following picture shall give an overview on the complete evaluation board EVA2100-A/B. It explains the most important components and can be used as a reference for the next paragraphs.

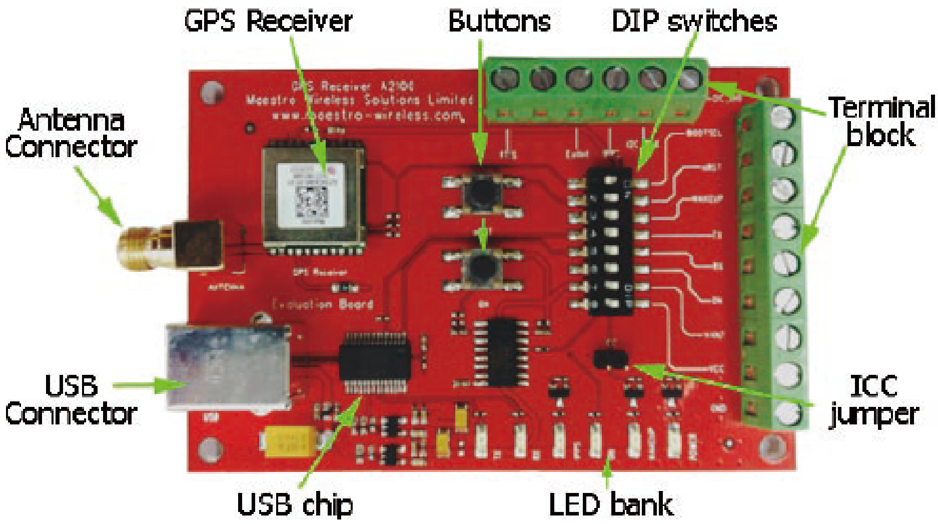


Figure 11: Board overview

5 On-Board Peripherals

5.1 ON and RESET Push-Button

The EVA2100-A/B has two push-buttons:

- ON (ON / OFF functionality)
- nRST (RESET functionality)

After power on pushing the “ON” button will start the A2100-A//B module. This is absolutely necessary to get the module going. The “ON” button must be used as well in other cases, e.g. in order to request a position when in SiRFaware^{TM} state or to go to hibernate mode and wake up again.

The “nRST” button is used to get a full reset of the GPS module. After pushing this button the module starts again with all default parameters stored in non-volatile memory.

5.2 Antenna Connector

The A2100-A/B supports one antenna input. Both active and passive GPS antennas can be connected to GPS input as below. Only active GPS antenna was equipped inside evaluation kit.”

As the active antenna needs voltage supplied through the VANT pin of the module, please make sure that the VANT DIP switch is in “ON” position.

Note: Do not supply voltage externally when VANT DIP switch is in “ON” position, leave terminal open!

If the DIP switch is in “OFF” position, an according voltage (3.3V to 5.0V) must be supplied through the VANT terminal of the terminal block.

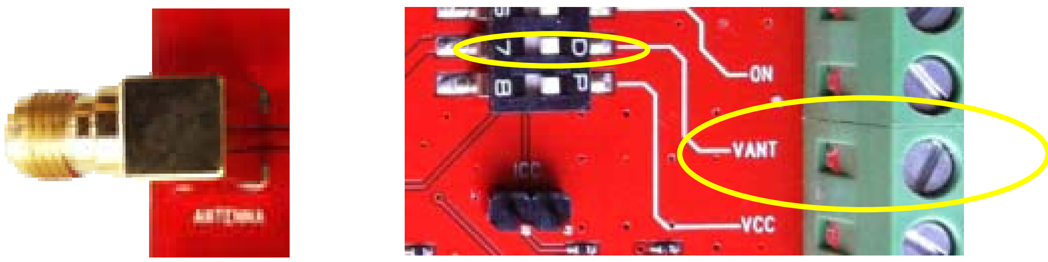


Figure 12: Antenna connector and VANT DIP switch with terminal

5.3 LEDs

There are 6 LEDs on the EVA2100-A/B that indicate different signals from the GPS receiver (order of LED's on EVA2100-A/B from left to right):

LED	Name	Function	Description
D1	TX	Transmit	Serial data traffic (from GPS receiver)
D2	RX	Receive	Serial data traffic (into GPS receiver)
D5	1PPS	Timing	1PPS signal at rising edge (1 pulse per second, duration 500 ms typ.)
D3	ON	ON	ON after Reset, position request during PTF cycle and in SiRFaware mode (the LED visualizes the ON pulse)
D4	WAKEUP	Operational state	HIGH: Full operation LOW: Module in a low power mode
D6	POWER	Power/Vcc	Power on LED

Table 1: LEDs function and description



Figure 13: EVA2100-A/B LEDs

6 Design-in Support

The EVA2100-A/B Evaluation board offers the possibility to implement the A2100-A/B GPS receiver module temporarily into your design by using the terminal block with 15 connections. To operate the EVA2100-A/B via this terminal block, please check “Table 3: Switch settings”.

Please note:

- VCC power input is **not** protected against reversed polarity

EVA2100-A

- External supply has to be within the range of 3.3 to 3.6 VDC

EVA2100-B

- External supply has to be within the range of 1.8 to 1.9 VDC

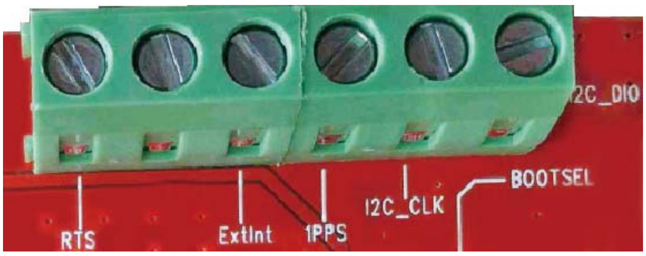
6.1 Terminal Block

The terminal block offers direct access to the A2100-A/B GPS receiver pins.

Pin	1	2	3	4	5	6
Port	RTS	NC	ExtInt	1PPS	I2C_CLK	I2C_DIO

Pin	7	8	9	10	11	12	13	14	15
Port	BOOTSEL	nRST (reset)	WAKEUP (operational mode)	TX	RX	ON	VANT	VCC	GND

Table 2: Terminal block description



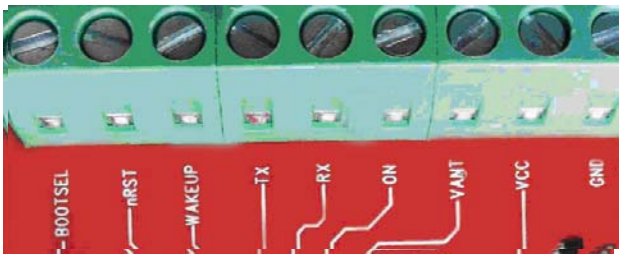


Figure 14: Terminal block

6.2 DIP Switch Settings

The following picture shows the DIP switches of the EVA2100-A/B. Except for GND they are connected 1:1 to the terminal block from BOOTSEL to VCC.

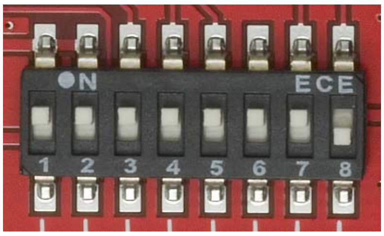


Figure 15: DIP switches (picture turned by 90° ccw)

Switch	Function	Operation via USB connector (default settings)	Operation via terminal block
S1	BOOTSEL	OFF	OFF (*1)
S2	nRST	ON	OFF
S3	WAKEUP	ON	OFF
S4	TX	ON	OFF
S5	RX	ON	OFF
S6	ON	ON	OFF
S7	VANT	ON	OFF
S8	VCC	ON	OFF

Table 3: Switch settings

*1: The BOOTSEL switch can be set to flash Firmware to the A2100-A/B GPS receiver. Switch the BOOTSEL switch to “ON”, press and release the nRST button. After this push the ON button. The A2100-A/B is now waiting to receive new firmware data via UART.

After upgrading the firmware switch the BOOTSEL switch to “OFF” and push first the nRST and then the ON button again for restarting normal GPS receiver operation.

Related software tool and documentation: SiRFflash

6.3 ICC Jumper



Figure 16: ICC jumper

As long as the VCC DIP switch is “ON” the ICC jumper is bridged. By putting the VCC DIP switch to the OFF position the current draw of the A2100-A/B GPS receiver can be measured directly by connecting a low resistance measurement device to the ICC jumper.

The low resistance measurement device should be connected before VCC is switched off!

7 NMEA Port

- Default setting: 4800 baud, 8 data bits, no parity, 1 stop bit, no flow control!
- Standard NMEA-0183 output on NMEA, baud rate selectable.
- Standard USB connectors

8 EVA2100-A/B Firmware and NMEA Sentences

See separate document **GPS Firmware** for a detailed description of the standard firmware loaded onto the modules delivered with the EVA2100-A/B.

9 Shut-Down Sequence

Care must be taken to implement an orderly shut-down sequence along with supplying power for a certain period of time after initiating the shut-down sequence. Abrupt removal or drop of power while the module is running has risks ranging from minor impact on TTFF to fatal, permanent corruption of flash memory code area!

The shut-down sequence can either be initiated by a command (NMEA or binary) or by toggling the ON_OFF pin. It is strongly recommended to press the “ON” button before removing power from the evaluation board!

The shutdown is completed after maximum 1s. Therefore the module should be at least supplied with voltage for that time after the shutdown sequence was initiated. In case the voltage supply will be available then continuously, it is necessary to wake up the GPS module again by toggling the ON_OFF pin.

10 Board Schematics

The following shows the schematics of the EVA2100-A/B. For best readability the picture was enlarged to cover the complete page.

Please note that the design is done in a way that it reflects the Minimum Configuration as outlined in the GPS Receiver Manual A2100! These are especially:

- The A2100-A/B needs an external pull-up resistor to be configured for UART operation. Although first firmware releases will work with the UART interface by default future releases will not. Please consider the pull-up resistor in your design or pull the GPIO up right after reset by other means.

- The ON_OFF input of the A2100-A/B needs to be connected to a push-pull output of a microprocessor. For a wake-up, including the initial one after power on, a LOW-HIGH transmission is mandatory.

- The nRST pin of the A2100-A/B needs to be connected to an open collector / open drain output of a microprocessor! This is necessary to work with SiR-Faware™. Pulling nRST low and afterwards toggling of ON_OFF will get the module to report a position fix when in SiRFaware™ mode.

The following picture shows the minimum configuration for using the A2100-A/B in UART mode with a passive antenna. In addition BOOTSEL and VANT are supported on the evaluation board!

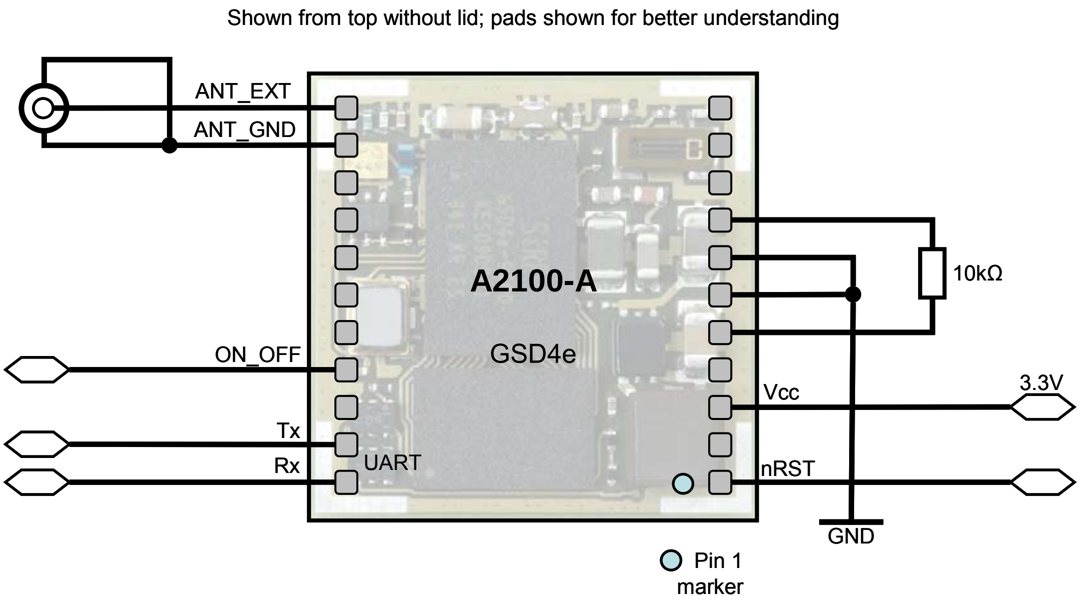


Figure 17: Minimum configuration A2100-A

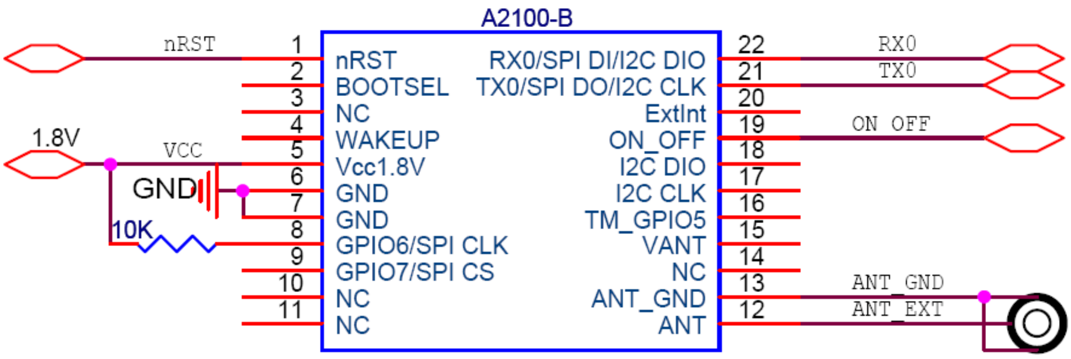


Figure 18: Minimum configuration A2100-B

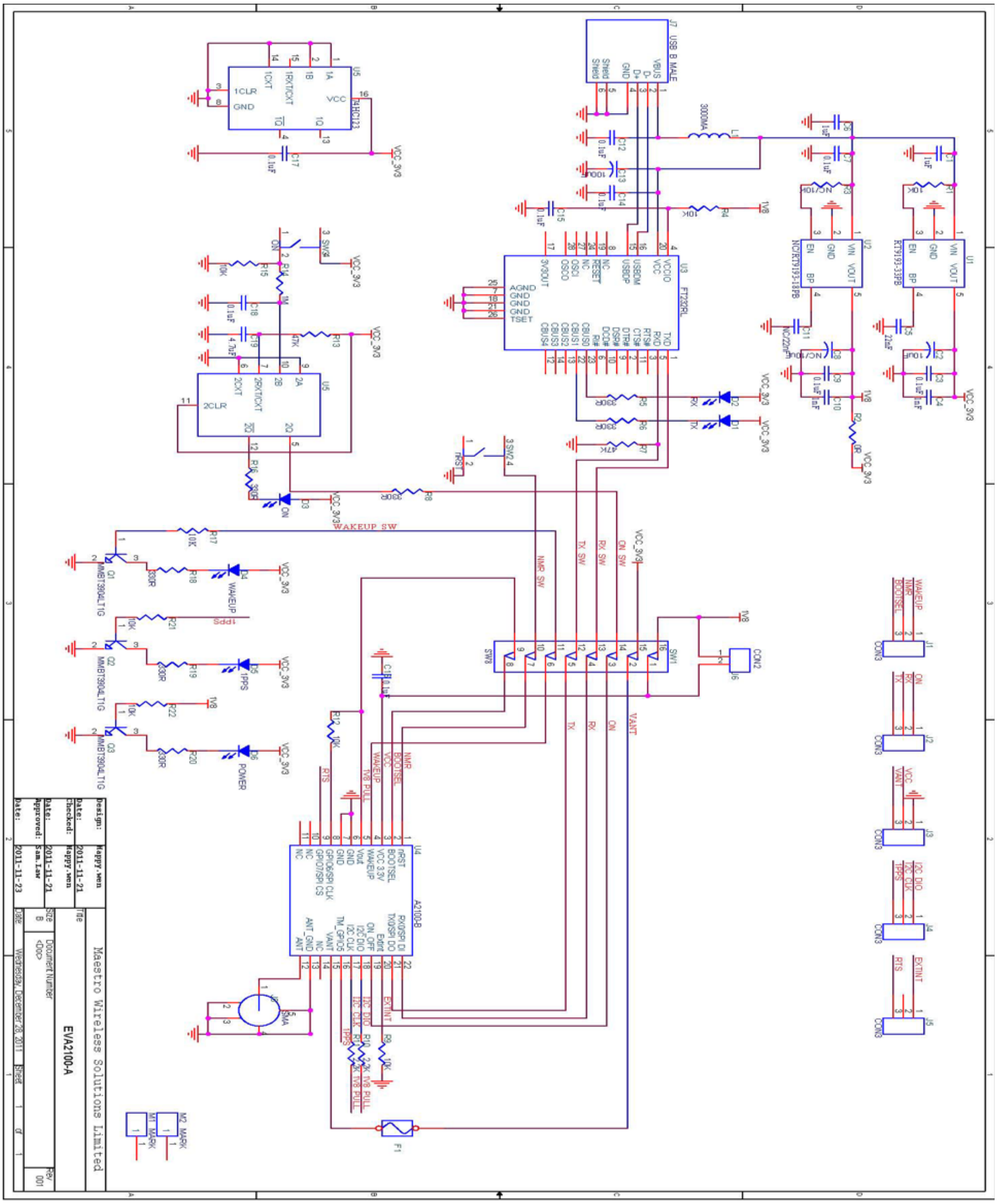


Figure 19: EVA2100-A board schematics

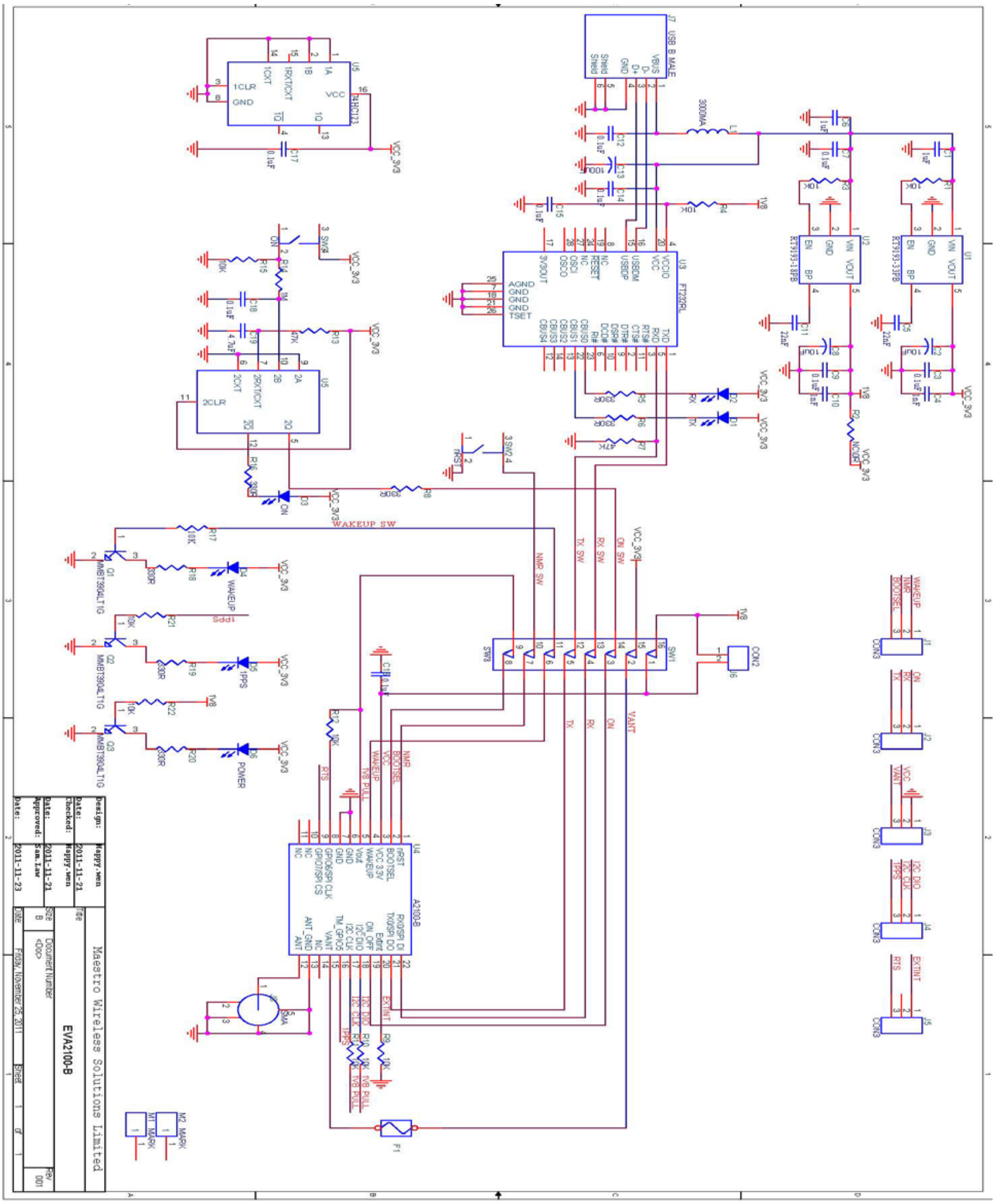


Figure 20: EVA2100-B board schematics

11 Related Information

11.1 Contact

This manual was created with due diligence. We hope that it will be helpful to the user to get the most out of the GPS module.

Inputs regarding errors or mistaken verbalizations and comments or proposals to Maestro, Hongkong, for further improvements are highly appreciated.

Maestro Wireless Solutions Limited
Add:Unit 3603-09,36/F.,118 Connaught Road West,HK

Main Line: (852) 28690688
Fax: (852)25254701

support-gps@maestro-wireless.com
www.maestro-wireless.com

11.2 Related Documents

- GPS Receiver A2100 (Maestro)
- Firmware upgrading for GPS Modules (Maestro)
- SiRF_NEMA_Reference_Manual (SiRF)
- SiRF_OSP_Reference_Manual (SiRF)

11.3 Related Tools

- GPS Cockpit (Maestro)
- SiRFLive (SiRF)
- SiRFflash (SiRF)

12 List of Figures

13 List of Tables